



## United Kingdom of Great Britain and Northern Ireland (UK) National Report to the Scientific Committee of the Indian Ocean Tuna Commission, 2022

J. Moir Clark<sup>1</sup>, C.C. Mees<sup>1</sup>, J. Pearce<sup>1</sup>, J. Chapman<sup>1</sup>, C. Etridge<sup>2</sup>, L.S. Townley<sup>3</sup>

1. MRAG Ltd 18 Queen Street, London W1J 5PN, UK for the BIOT Administration
2. Marine Management Organisation
3. Department for Environment, Food & Rural Affairs of the United Kingdom

### INFORMATION ON FISHERIES, RESEARCH AND STATISTICS

<p>In accordance with IOTC Resolution 15/02, final scientific data for the previous year was provided to the IOTC Secretariat by 30 June of the current year, <b>for all fleets other than longline</b> [e.g. for a National Report submitted to the IOTC Secretariat in 2022, final data for the 2021 calendar year must be provided to the Secretariat by 30 June 2022)</p>	<p>YES  29/06/2022</p>
<p>In accordance with IOTC Resolution 15/02, provisional <b>longline data</b> for the previous year was provided to the IOTC Secretariat by 30 June of the current year [e.g. for a National Report submitted to the IOTC Secretariat in 2022, preliminary data for the 2021 calendar year was provided to the IOTC Secretariat by 30 June 2022].</p> <p><b>REMINDER:</b> Final longline data for the previous year is due to the IOTC Secretariat by 30 Dec of the current year [e.g. for a National Report submitted to the IOTC Secretariat in 2022, final data for the 2021 calendar year must be provided to the Secretariat by 30 December 2022].</p>	<p>NO</p>
<p>If no, please indicate the reason(s) and intended actions: The UK has no longline vessels operating within IOTC jurisdiction in 2021. The UK British Indian Ocean Territory (BIOT) Administration does not operate a flag registry, BIOT does not have a fleet of commercial fishing vessels, and there is no commercial port in BIOT. The waters of the Territory are a no-take Marine Protected Area (MPA) to commercial fishing. An MPA exclusion zone covering Diego Garcia and its territorial waters exists where pelagic and demersal recreational fisheries are permitted. The recreational fishery catches some tuna and tuna like species.</p>	



---

## Executive Summary [Mandatory]

This report is from the UK and primarily concerns the recreational fisheries in the British Indian Ocean Territory (BIOT). The UK had no commercial fleet operating during 2021.

BIOT waters are a no-take Marine Protected Area (MPA) to commercial fishing. Diego Garcia and its territorial waters are excluded from the MPA and include a recreational fishery. UK (BIOT) does not operate a flag registry and has no commercial tuna fleet or fishing port. The UK National Report summarises fishing in the BIOT recreational fishery in 2021 and provides details of research activities undertaken to date within the MPA.

The recreational fishery landed 9.1 tonnes of tuna and tuna like species on Diego Garcia in 2021. Principle target tuna species of the industrial fisheries (yellowfin and skipjack tunas) contributed to 33% of the total catch of tuna and tuna like species of the recreational fishery. Recognising that yellowfin tuna are currently overfished and subject to overfishing in the Indian Ocean and that Resolution 19/01 seeks to address this, UK(BIOT) have been taking action to reduce the number of yellowfin tuna caught in the BIOT recreational fishery and encouraging their live release. Length frequency data were recorded for a sample of 359 yellowfin tuna from this fishery. The mean length was 73.3cm. Sharks caught in the recreational fishery are released alive.

IUU fishing remains one of the greatest threats to the BIOT ecosystem but a range of other threats exist including invasive and pest species, climate change, coastal change, disease, and pollution, included discarded fishing gear such as Fish Aggregating Devices. During 2021 the BIOT Environment Officer continued to take forward the current conservation priorities. In 2021/22 Recommendations of the Scientific Committee and those translated into Resolutions of the Commission have been implemented as appropriate by the BIOT Authorities and are reported.



**Table of Contents**

1 Background/General fishery information ..... 4

2 Fleet structure ..... 4

3 Catch and effort (by species and gear) ..... 4

4 Recreational fishery ..... 9

5 Ecosystem and bycatch issues [Mandatory] ..... 9

5.1 Sharks [Mandatory] ..... 9

5.2 Seabirds [Mandatory] ..... 10

5.3 Marine Turtles [Mandatory] ..... 11

5.4 Other ecologically related species (e.g. marine mammals, whale sharks) [Desirable] ..... 12

6 National data collection and processing systems [Mandatory] ..... 13

6.1 Logsheet data collection and verification (including date commenced and status of implementation) ..... 13

6.2 Vessel Monitoring System (including date commenced and status of implementation) ..... 13

6.3 Observer scheme (including date commenced and status; number of observer, include percentage coverage by gear type) ..... 13

6.4 Port sampling programme [including date commenced and status of implementation] ..... 14

6.5 Unloading/Transshipment of flag vessels [including date commenced and status of implementation] ..... 15

6.6 Actions taken to monitor catches & manage fisheries for Striped Marlin, Black Marlin, Blue Marlin and Indo-pacific Sailfish [Mandatory] ..... 15

6.7 Gillnet observer coverage and monitoring [Desirable] ..... 15

6.8 Sampling plans for mobulid rays [Mandatory] ..... 15

7 National research programs [Desirable] ..... 16

7.1 National research programs on blue shark ..... 16

7.2 National research programs on Striped Marlin, Black Marlin, Blue Marlin and Indo-pacific Sailfish ..... 16

7.3 National research programs on sharks ..... 16

7.4 National research programs on oceanic whitetip sharks ..... 16

7.5 National research programs on marine turtles ..... 16

7.6 National research programs on thresher sharks ..... 16

8 Implementation of Scientific Committee Recommendations and Resolutions of the IOTC relevant to the SC ..... 19

9 Literature cited ..... 19

### 1 Background/General fishery information [MANDATORY]

UK did not have any vessels registered in the IOTC RAV in 2021.

The recreational fishery catches some tuna and tuna-like species. Permitted recreational fisheries also include visiting yachts that fish outside the exclusion zone within the waters of the MPA, but not within Strict Nature Reserves. Such fishing must be for consumption within three days. Yachts must apply for a permit to moor in designated areas.

### 2 Fleet structure [MANDATORY]

N/A: As stated above, UK (BIOT) does not have a flag registry or fleet of commercial fishing vessels. The recreational fishery is described in Section 4. The number of UK flagged vessels operating over the last 5 years is shown in **Error! Reference source not found.**

**Table 1 Number of vessels operating in the IOTC area of competence, by gear type and size: 2017–2021**

<i>Year</i>	<i>Number of Vessels Licensed</i>	<i>Number of Vessels Active</i>	<i>Length</i>
2021	0	0	NA
2020	1	1 (drifting longliners)	45 Metres
2019	2	2 (drifting longliners)	39 metres – 45 metres
2018	2	2 (drifting longliners)	39 metres – 45 metres
2017	2	2 (drifting longliners)	40 metres – 47 metres

### 3 Catch and effort (by species and gear) [MANDATORY]

UK had no vessels registered on the RAV during 2021, catch and effort for primary species is shown in Table 2.

**Table 2 Annual catch and effort of primary species in the IOTC area of competence, 2017 – 2021.**

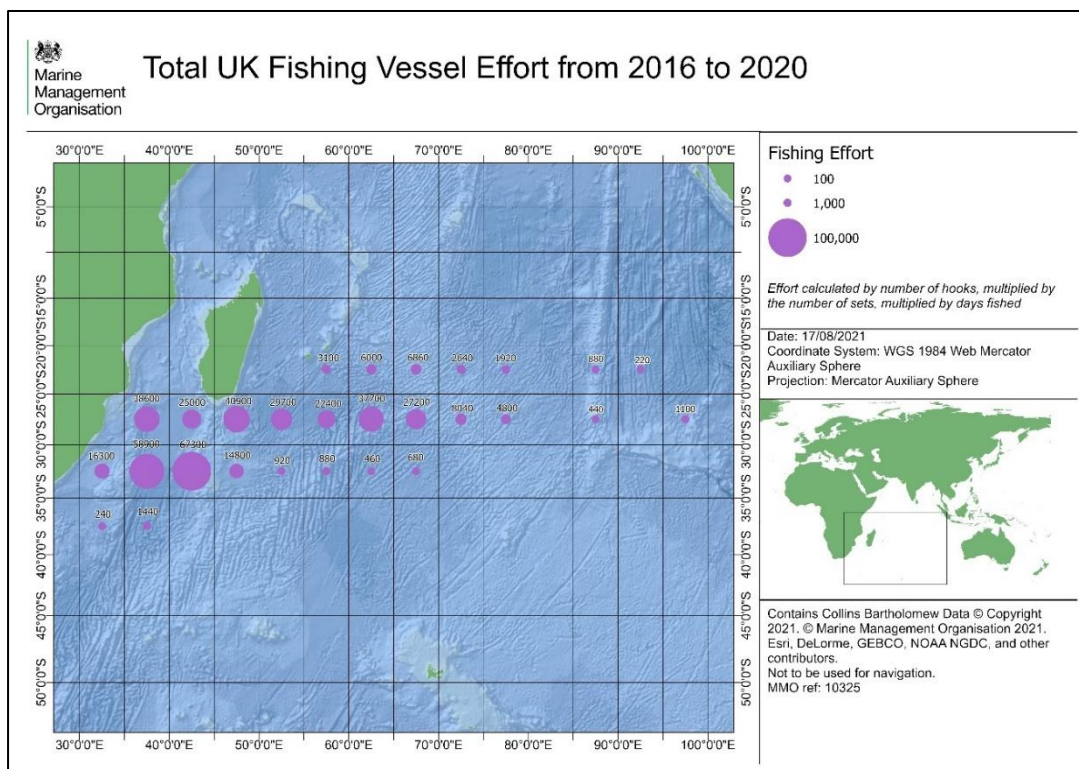
<b>Year</b>	<b>Total Effort</b>	<b>Total Catch</b>
2021	0	0
2020	270000	411.9
2019	621600	881.8
2018	498100	989.3
2017	500300	579.8

Species name	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Albacore	8.7	5.1	4.0	6.6	7.0	7.9	8.5	2.1	3.1	1.0	1.3	0.0	0.0
AmberJack	0.0	5.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Barracuda	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bigeye Tuna	0.0	3.5	3.2	3.3	0.0	0.0	0.0	0.0	2.5	2.3	1.9	0.0	0.0
Sailfish	21.7	24.4	4.6	1.7	0.0	0.0	0.0	0.0	3.3	3.9	0.8	0.0	0.0
Black Marlin	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	13.1	12.3	4.3	0.0
Bonito	5.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Blue Shark	427.1	379.3	333.0	326.4	193.4	251.8	215.3	172.4	195.7	369.5	371.8	157.1	0.0
Blue Marlin	0.0	1.3	9.3	20.4	16.5	11.7	7.9	3.5	4.1	0.0	0.0	0.0	0.0
Common dolphinfish	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.6	2.9	3.3	0.9	0.0
Silky Shark	0.4	2.5	1.3	1.5	0.0	0.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0
Other or mixed Demersal	1.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Haddock	0.0	0.0	0.0	55.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Snake Mackerel	4.5	46.1	35.0	50.0	47.0	41.3	30.5	19.6	17.6	31.6	16.6	6.7	0.0
Longfin mako	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.0	0.0	0.0
Mako Shark	44.3	52.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Oilfish	32.7	4.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Indo-Pacific Sailfish	0.9	5.5	3.0	7.5	5.7	2.8	1.2	1.7	1.2	7.3	3.5	1.4	0.0
Sharks	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Shortfin mako	16.7	17.0	62.1	70.2	46.5	54.0	26.1	22.8	68.2	87.4	72.0	32.9	0.0
Scalloped Hammerhead Shark	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Swordfish	646.3	684.0	679.6	687.3	558.9	527.2	365.0	203.7	284.2	523.0	383.2	202.4	0.0
Tuna - Other	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Wahoo	0.0	1.8	1.5	3.5	2.1	2.8	1.7	0.4	0.7	1.6	0.8	0.0	0.0
Yellowfin tuna	120.4	51.6	42.7	56.8	53.9	85.9	85.4	41.8	20.6	9.1	14.2	6.2	0.0
Yellowtail Amberjack	3.8	10.0	20.8	10.5	8.3	18.7	4.0	1.4	7.2	0.5	0.0	0.0	0.0
Grand Total	1334.4	1295.5	1200.0	1300.8	939.2	1004.0	745.6	469.4	613.8	1053.4	881.8	411.9	0.0

**Figure 1. Historical annual catch for the national fleet, by gear and primary species, for the IOTC area of competence for the entire history of the fishery/fleet.**

**Figure 2a. Map of the distribution of fishing effort, by gear type for the national fleet in the IOTC area of competence (most recent year).**

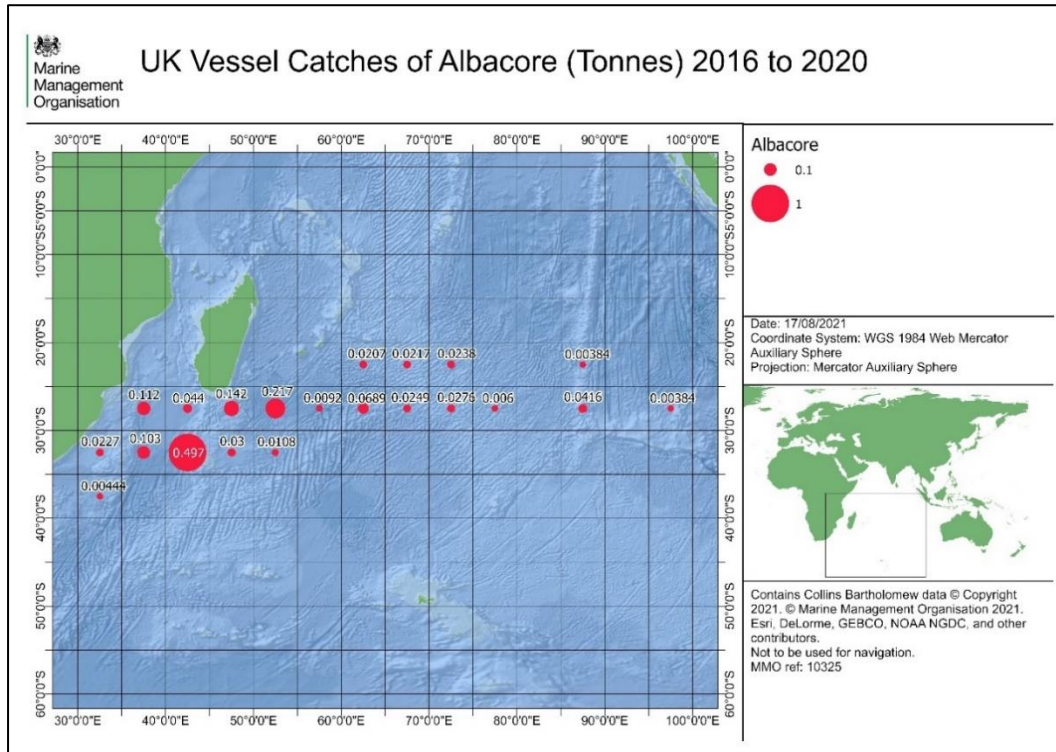
There was no commercial fishing activity by the UK fleet in IOTC area of competence in 2021. Please refer to map under figure 2b for average catch between 2016-2020.



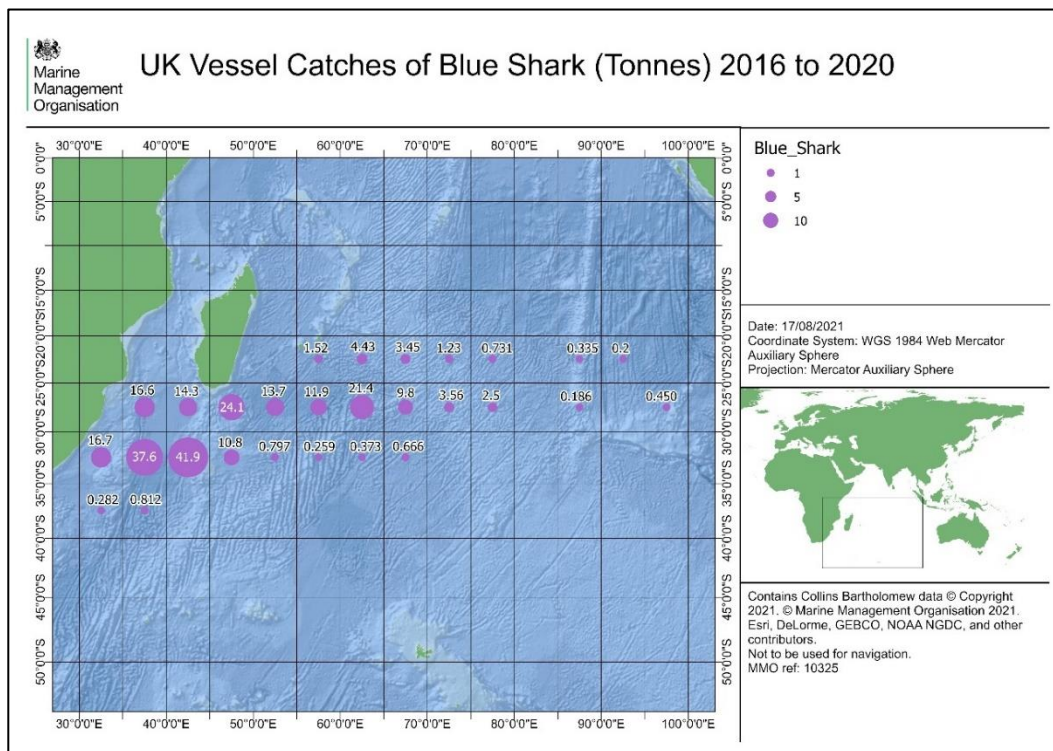
**Figure 2b. Map of the distribution of fishing effort, by gear type for the national fleet in the IOTC area of competence (average of 2016–2020)**

**Figure 3a. Map of distribution of fishing catch, by species for the national fleet, in the IOTC area of competence (2021).**

There was no commercial fishing activity by the UK fleet in IOTC area of competence in 2021. Please refer to maps under figure 3b for average catch between 2016-2020.



**Figure 3b (1). Distribution of UK catch of albacore tuna (tonnes) 5° area (average 2016-2020)**



**Figure 3b (2). Distribution of UK catch of blue shark (tonnes) by 5° area (average 2016-2020)**

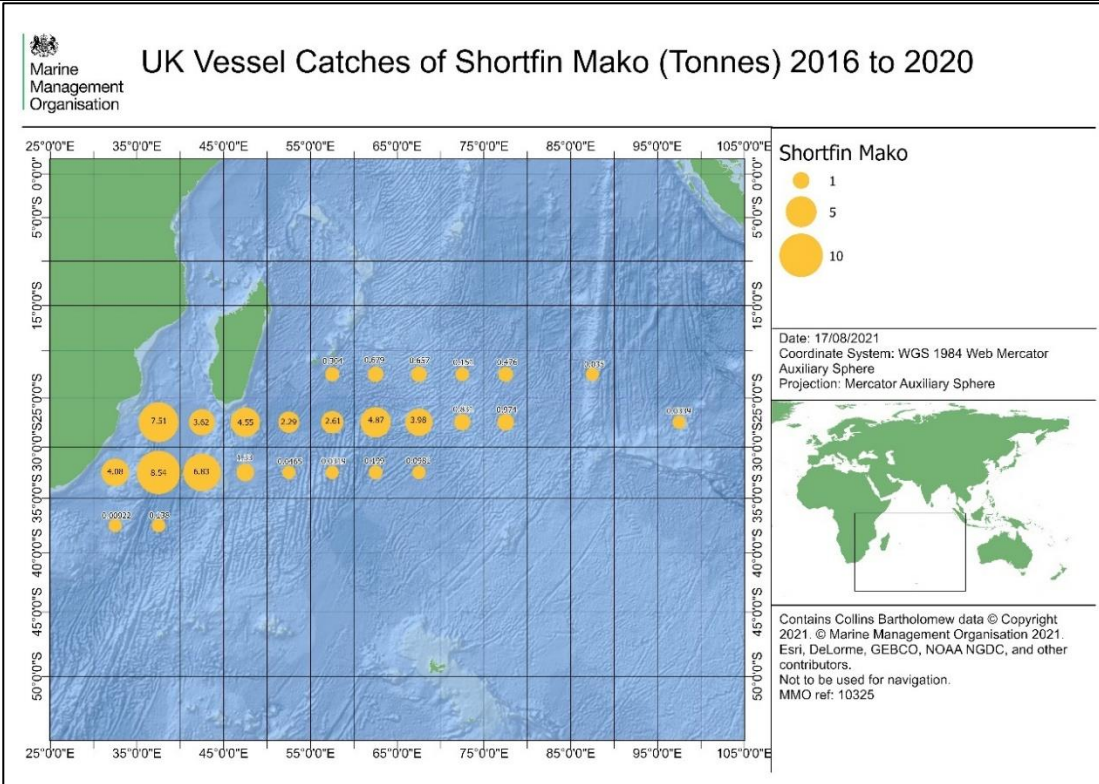


Figure 3b (3). Distribution of UK catch of shortfin mako (tonnes) by 5° area (average 2016-2020)

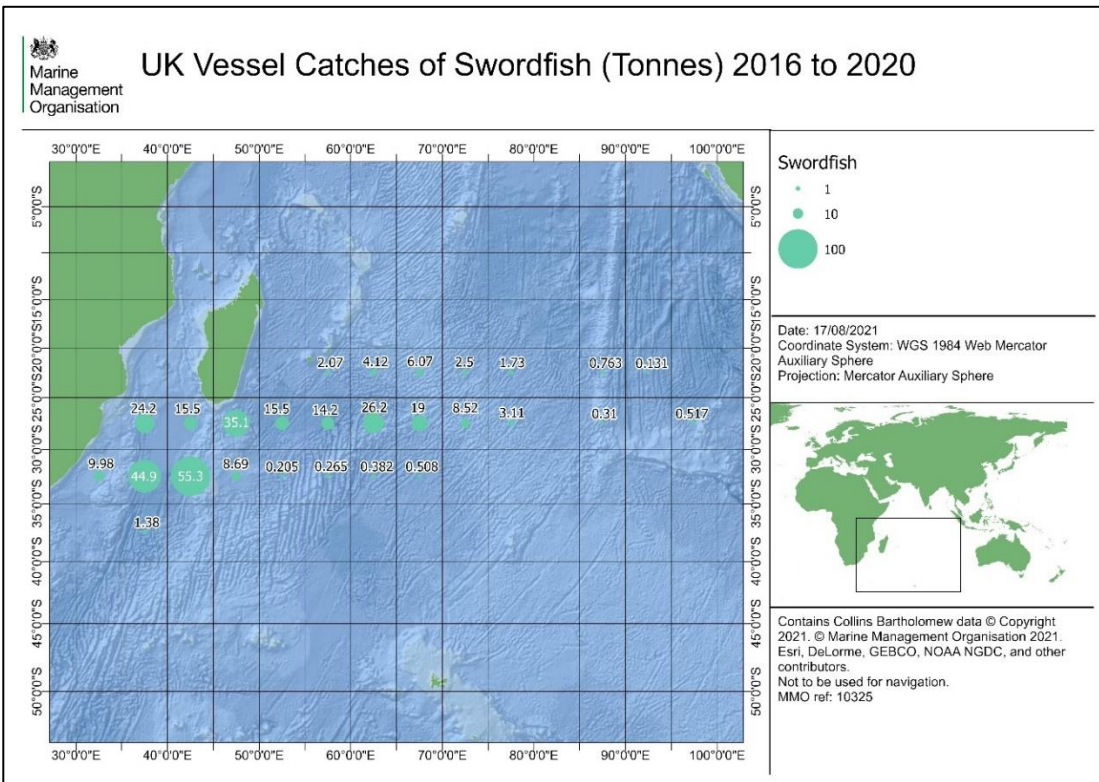
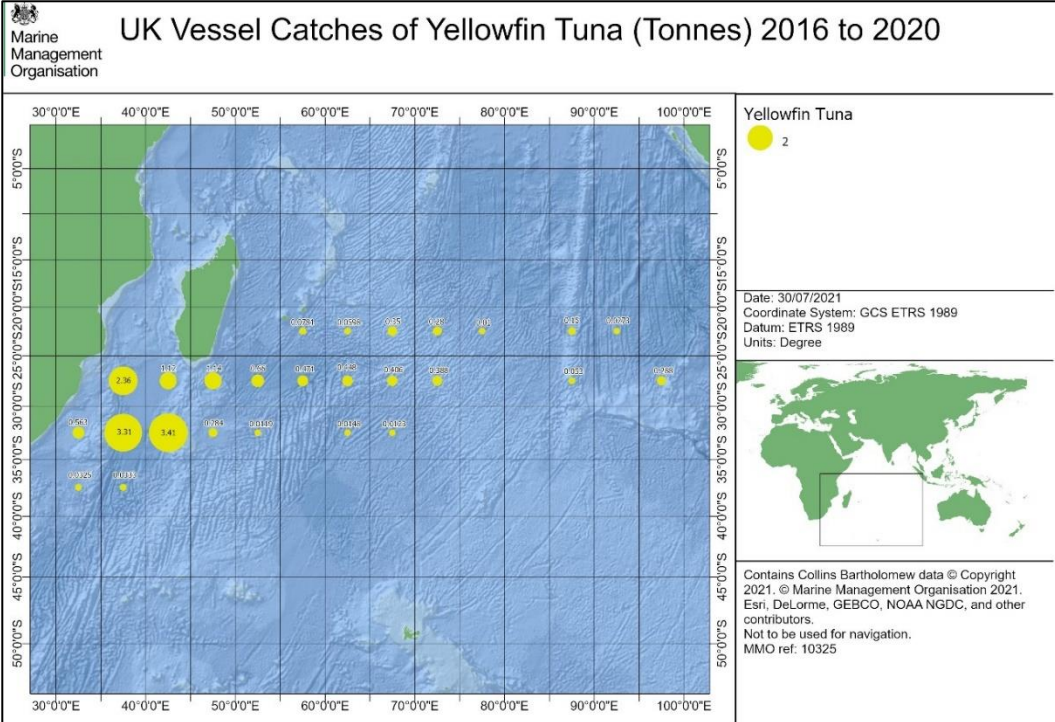
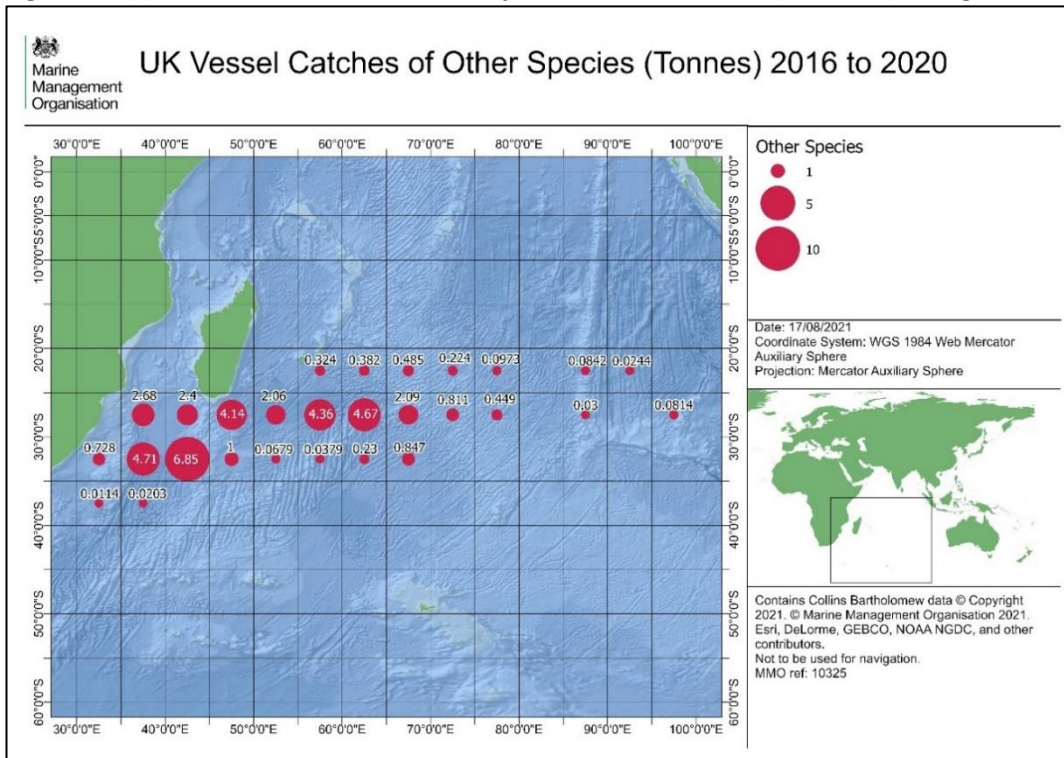


Figure 3b (4). Distribution of UK catch of swordfish (tonnes) by 5° area (average 2016-2020)



**Figure 3b (5). Distribution of UK catch of yellowfin tuna (tonnes) 5° area (average 2016-2020)**



**Figure 3b (5). Distribution of UK catch of other species (tonnes) 5° area (average 2016-2020)**



#### 4 Recreational fishery [MANDATORY]

A small recreational fishery occurs in Diego Garcia. A total of 9.1 tonnes of tuna and tuna like species were caught in 2021, shown in the table below, reef associated species are also caught in this fishery. The principle commercial tuna species, yellowfin and skipjack tunas (no bigeye were landed), contributed 49.35% of the total catch of tuna and tuna like species of the recreational fishery.

Recognising that yellowfin tuna are currently overfished and subject to overfishing in the Indian Ocean and that Resolution 19/01 seeks to address this, the UK have been taking action to reduce the number of yellowfin tuna caught in the recreational fishery and encouraging their live-release.

#### Catches of tuna and tuna like species landed from the UK (BIOT) recreational fishery during the period 2017-2021

Year	Estimated catch of tuna and tuna like species (kg)										Total (kg)		
	Blue marlin	Dolphinfish	Kawakawa	Rainbow runner	Sailfish	Wahoo	Dogtooth tuna	Skipjack tuna	Yellowfin tuna	Other tuna nei	Tunas	Tuna like spp	All
2017	0	70	1525	288	0	7899	569	107	2425	0	3401	9783	13184
2018	0	94	1189	153	0	5163	189	176	4313	0	4678	6599	11277
2019	0	32	1201	186	0	3859	109	257	2770	299	3434	5279	8713
2020	0.0	31.8	345.2	76.2	141.1	2663.9	10.4	117.9	3110.7	45.4	3284.5	3258.2	13928.2
2021	9.1	22.2	582.4	39.9	0.0	5421.3	342.9	78.0	2622.7	0.0	3043.6	6075.0	9118.6

Length data have been collected for yellowfin tuna (*T. albacares*) from the recreational fishery since June 2009. A total of 359 fish were measured in 2021. The mean length of the *T. albacares* sampled was 73.37cm. For comparison, observer programmes on purse seiners (2005/6) and longliners (2003/4) operating in BIOT recorded mean lengths of 98cm (n=378) and 123cm (n=2385) respectively and the mean length in the recreational fishery in 2020 was 78.6 cm with a range of 55-110 cm.

#### 5 Ecosystem and bycatch issues [Mandatory]

The BIOT zone, excluding territorial waters around Diego Garcia, is a no-take MPA closed to commercial fishing. The recreational fishery on Diego Garcia is monitored. Beyond the blanket protection of all species through the declaration of the MPA, there are currently no separate national plans of action in place for individual species or species groups. However, in its recreational fishery, all sharks and billfish caught must be released alive and fishers are encouraged to release yellowfin tuna.

The current ecosystem threats relate to illegal unreported and unregulated fishing of which a number of events were detected by the BIOT Patrol Vessel in 2021 and are reported separately to the Compliance Committee. Controlling IUU is a core element of the current conservation priorities (see <https://biot.gov.io/environment/>).

Other threats to the ecosystem that have been identified include invasive and pest species (e.g. introduced by visiting vessels), climate change (including weather changes; coral bleaching and mortality, sea level rise, likely increasing rates of erosion or inundation events; and oceanic chemical composition change), coastal change, disease (particularly of corals), and pollution. The latter includes lost and abandoned fishing gear including fish aggregating devices (FADs) which can have harmful impacts on species and habitats within BIOT, research has been undertaken on their potential impacts (MRAG 2019a) and how currents and oceanic conditions may influence their movement throughout BIOT (MRAG 2019c). Consequently, these also form a core element of the current conservation priorities.

##### 5.1 Sharks [Mandatory]

Sharks must be released alive when caught in the recreational fishery. Sharks continue to be caught illegally by IUU vessels in BIOT waters. No commercial fishery operated in 2021.

Research, including tagging of sharks in BIOT waters is ongoing through the Bertarelli Programme on Marine Science which includes scientific research expeditions in BIOT (see Table 8).

### 5.1.1. NPOA sharks [Desirable]

N/A

### 5.1.2. Sharks finning regulation [Mandatory]

In 2020 the UK operated under Council Regulation (EU) No 605/2013 whereby all EU vessels wherever they fish are required to land sharks with their “fins naturally attached”.

The UK has a limited capacity to conduct inspections at sea and during landing for those vessels that fish in the IOTC area and land into ports where we do not have an inspection presence.

With regards compliance this is not applicable during 2021 as no UK vessels were operational during this period.

### 5.1.3. Blue shark [Mandatory]

Statistical data on catch and effort relating to blue shark have been reported in line with the provision of Resolution 15/01. Biological data - size and discard data have been provided in accordance with the Resolution 15/02 since 2017 when on board observers for the UK vessels operating in the IOTC area were first deployed.

**Table 3: Total number and weight of sharks, by species, retained by the national fleet in the IOTC area of competence (2016–2021).**

Year	Catches by Species (longline gear)							Total
	Blue	Oceanic white tip	Scalloped hammerhead	Shortfin mako	Silky	Bigeye thresher	Pelagic thresher	
2021	0	0	0	0	0	0	0	0
2020	157.1	0	0	32.9	0	0	0	190.0
2019	378.8	0	0	72.0	0	0	0	450.8
2018	369.5	0	0	87.4	0	0	0	456.9
2017	195.7	0	0	68.2	0	0	0	263.9
2016	172.4	0	0	22.8	0	0	0	195.2

**Table 4:** Total number of sharks, by species, released/discarded by the national fleet in the IOTC area of competence (for the most recent five years at a minimum, e.g. 2017–2021). Where available, include life status upon released/discard.

## 5.2 Seabirds [Mandatory]

Seabird bycatch does not occur in the recreational fishery and has not been observed in IUU fisheries. No Commercial fishery operated in 2021.

### Observer seabird interaction data sheet for the IOTC longline fleet [Desirable]

Reporting period\* or calendar year 2021

Species \_\_\_\_\_

Fishery		Observed					Estimate
Area <sup>1</sup>	Total effort <sup>2</sup>	Total observed effort <sup>2</sup>	Observer coverage <sup>3</sup>	Captures (number)	Mortalities (number)	Live releases (number)	Mortality estimate (number)
NA	NA	NA	NA	NA	NA	NA	NA

Total							
-------	--	--	--	--	--	--	--

\*This field can be used to specify a temporal stratification to the data e.g. season

<sup>1</sup>Spatial stratification (5x5, 10x10 or other – to be determined)

<sup>2</sup>Number of hooks observed hauled

<sup>3</sup>Percentage of all hooks set that were observed hauled

1. How many vessels operated south of 25°S in the period covered by this report?
2. How many of those vessels used bird scaring lines (as a proportion of total effort)?
3. How many of those vessels used line weighting (as a proportion of total effort)?
4. How many of those vessels used night setting (as a proportion of total effort)?

### 5.3 Marine Turtles [Mandatory]

No turtle bycatch / interaction was reported in the BIOT recreational fishery in 2021. The BIOT area includes undisturbed and recovering populations of hawksbill and green turtles. Island sweeps are conducted as part of the normal monitoring programme, where part or entire islands are inspected, turtle nesting tracks are regularly encountered and recorded.

No incidents reported to the UK Fisheries Monitoring Centre in 2020. In 2021 there was no commercial fishing activity by the UK fleet in the IOTC area.

Year	Fishery – Longlines (logbook data)			Observed ** (Observer reports)				
	Lat*	Lon	Total effort	Total effort observed	Species	Captures (number)	Mortalities (number)	Live releases (number)
2018	22.5	57.5	14400					
2018	22.5	62.5	13200					
2018	27.5	37.5	26400					
2018	27.5	42.5	34600					
2018	27.5	47.5	100400	2400				
2018	27.5	52.5	27200	6000	Loggerhead turtle (Caretta caretta)	1	0	1
2018	27.5	57.5	17600	3600				
2018	27.5	62.5	56900	21600				
2018	27.5	67.5	7700					
2018	27.5	72.5	20900					
2018	32.5	32.5	45600					
2018	32.5	37.5	39600	8400	Not identified	2	0	2

	Fishery – Longlines (logbook data)			Observed ** (Observer reports)				
2018	32.5	42.5	95300					
2018	32.5	47.5	3400					
2018	32.5	52.5	2200					
2018	32.5	62.5	2200					
2018	32.5	67.5	4400					
2019	22.5	62.5	1200					
2019	22.5	67.5	4800					
2019	27.5	37.5	2400					
2019	27.5	42.5	58800	2400				
2019	27.5	47.5	74400	6000	Loggerhead turtle ( <i>Caretta caretta</i> )	1	0	1
2019	27.5	52.5	81600	15600				
2019	27.5	57.5	46800					
2019	27.5	62.5	26400					
2019	27.5	67.5	7200					
2019	27.5	72.5	3600					
2019	32.5	32.5	36000					
2019	32.5	37.5	148800					
2019	32.5	42.5	69600	19200				
2019	32.5	47.5	40800	2400				
2019	32.5	52.5	2400					
2019	37.5	32.5	1200					
2019	37.5	37.5	7200					

**5.4 Other ecologically related species (e.g. marine mammals, whale sharks) [Desirable]**

See Table under section 5.3. Only marine turtles were caught by commercial vessels in the period covered by the table. No catches were recorded in 2020 or 2021. No incidental mortality /annual catches on other ecologically related species such as marine mammals and whale sharks have been observed in the recreational fishery.

**Table 5. Observed annual catches of species of special interest by species (seabirds, marine turtles and marine mammals) by gear for the national fleet, in the IOTC area of competence**

Year	Catches by Species (longline gear)		
	Seabirds	Marine mammals	Whale sharks
2021	0	0	0
2020	0	0	0
2019	0	0	0
2018	0	0	0
2017	0	0	0

## 6 National data collection and processing systems [Mandatory]

### 6.1 Logsheet data collection and verification (including date commenced and status of implementation)

No Commercial fisheries operated in the IOTC area of competence during 2021.

Logbook data collection for the recreational fishery is completed by the vessel charterer for each trip conducted. The system was introduced in 2006 and provides 100% coverage of all boat based recreational fishing activity. Prior to that a system of logbooks to be completed by fishers was utilised but proved less effective and did not achieve 100% coverage. A similar fisher-based system was introduced in 2016 for shore based recreational fishers, although they tend not to catch tuna and tuna like species.

### 6.2 Vessel Monitoring System (including date commenced and status of implementation)

No Commercial fisheries operated in the IOTC area of competence during 2021.

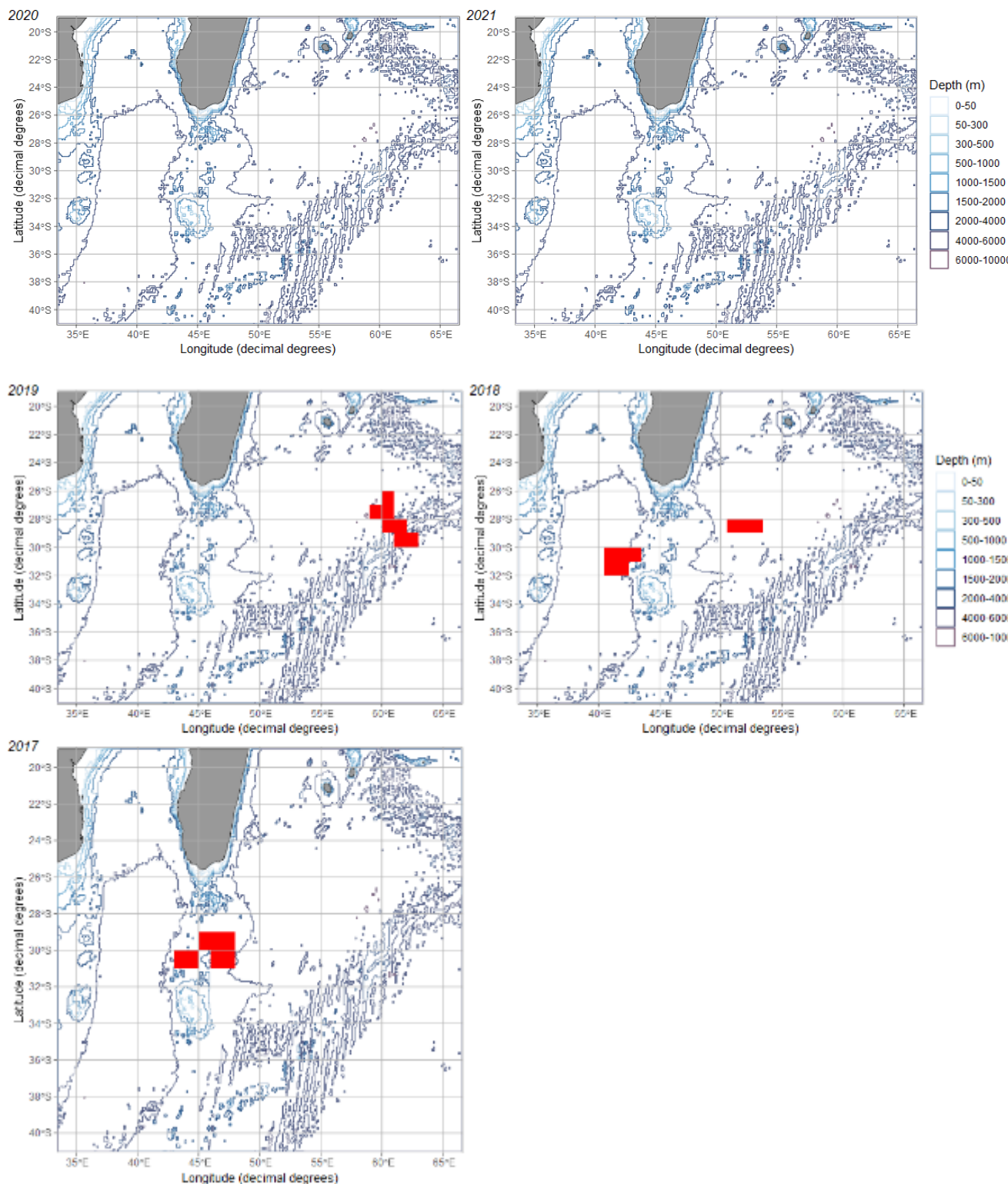
### 6.3 Observer scheme (including date commenced and status; number of observers, include percentage coverage by gear type)

The UK ran an observer programme in the Indian Ocean between 2017 and 2019. A single observer covered the two EU(UK) flagged longline vessels, spending time on each vessel and transferring between them to ensure that 5% coverage was reached. The observers collected data according to the protocols set out in the IOTC Regional Observer Scheme and the data were submitted in the required format to the Secretariat. Table 6 shows the level of coverage.

**Table 6. Annual observer coverage by operation, e.g. longline hooks, purse seine sets (for the most recent five years)**

Year	Observer coverage (longlines)		
	Hooks set	Hooks observed	Percent Observed
2021	0	0	0
2020	270,000	0	0
2019	621,600	45,000	7.2
2018	498,100	42,000	8.4
2017	500,300	38,688	7.7

**Figure 4.** Map showing the spatial distribution of observer coverage (note, no coverage in 2020 or 2021).



**6.4 Port sampling programme [including date commenced and status of implementation] [MANDATORY]**

The UK operated no commercial fisheries in the IOTC area of competence during 2021 and no port sampling regime has been in place.

**Table 7.** Number of vessel trips or vessels active monitored, by species and gear.

	Port sampling (all gears)	
Year	Vessel trips	Trips monitored
2021	0	0

**Table 8. Number of individuals measured, by species and gear**

	Port sampling (all gears)	
Year	Individuals landed	Individuals measured
2021	0	0

### 6.5 Unloading/Transshipment of flag vessels [including date commenced and status of implementation]

The UK operated no commercial fisheries in the IOTC area of competence during 2021 and no fish have been unloaded or transhipped.

**Table 9. Quantities by species and gear landed in ports located in the IOTC area of competence**

	Port landings (all gears)	
Year	Vessel port landings	Species landed
2021	0	NA

**Table 10. Quantities by species and gear transhipped in ports located in the IOTC area of competence**

	Port transshipments (all gears)	
Year	Vessel port transshipments	Species transhipped
2021	0	NA

### 6.6 Actions taken to monitor catches & manage fisheries for Striped Marlin, Black Marlin, Blue Marlin and Indo-pacific Sailfish [Mandatory]

The UK operated no commercial fisheries in the IOTC area of competence during 2021 and none of these species have been landed.

Within the recreational fishery gaffing billfish sailfish is prohibited under the licence terms and conditions and all should be unhooked and released if caught.

### 6.7 Gillnet observer coverage and monitoring [Desirable]

The UK operated no commercial fisheries in the IOTC area of competence during 2021 and has never operated a gillnet fishery in the area.

### 6.8 Sampling plans for mobulid rays [Mandatory]

The UK operated no commercial fisheries in the IOTC area of competence during 2021 and has no sampling plan in place.

## **7 National research programs [Desirable]**

Currently all research is conducted within BIOT through a series of expeditions funded under the Bertarelli Programme in Marine Science (BPMS, see Table 11). Research under the BPMS links to conservation priorities through 'Key Species' research.

Outputs of research conducted in BIOT can be accessed through the Chagos Information Portal (ChIP, <https://chagosinformationportal.org/>), the BPMS website ([www.marine.science](http://www.marine.science)) and the BIOT website <https://biot.gov.io/> where details of expeditions up to those conducted in 2020 are currently available <https://biot.gov.io/science/2020-science-expeditions/>. Table 2 gives an update on the outcomes of expeditions carried out in 2020, not previously reported on, and summarises the expeditions conducted during 2021.

### **7.1 National research programs on blue shark**

There is no National research programme specifically on blue shark, any caught in the IUU fisheries are measured and reported to IOTC.

### **7.2 National research programs on Striped Marlin, Black Marlin, Blue Marlin and Indo-pacific Sailfish**

There is no National research programme specifically on these species.

### **7.3 National research programs on sharks**

There is no National research programme specifically on sharks taken in fisheries, however there has been some general research programmes with BIOT (see for example publications 9, 11, 13, 15, 20, 22, 23 and 35 in Section 9).

### **7.4 National research programs on oceanic whitetip sharks**

There is no National research programme on whitetip sharks taken in the IOTC area of competence, however there has been some DNA studies conducted on sharks within BIOT during research expeditions.

### **7.5 National research programs on marine turtles**

There is no National research programme on marine turtles, however research is undertaken within BIOT on their global movements and the effects plastic has on them (see Table 8 - 1. Turtle survey and tagging, 3. BIOT plastics).

### **7.6 National research programs on thresher sharks**

There is no National research programme specifically to look at potential nursery areas, research has been undertaken to look at the effects of the landings ban on thresher sharks in Sri Lanka (see publication 9, Section 9).



**Table 8.** Summary table of national research programs, including dates.

Project title	Dates	Team	Objectives
1. Turtle survey and tagging	5 Jan- Sept 2021	<b>BPMS expedition 24</b> <ol style="list-style-type: none"> <li>Nicole Esteban (Swansea)</li> <li>Holly Stokes (Swansea)</li> </ol>	<b>Overall objective:</b> To study the nesting ecology and hatching success of sea turtles for an extended period during the hawksbill nesting season – PhD student to stay on site for up to 3 months. <b>Specific objectives:</b> <ol style="list-style-type: none"> <li>Tagging nesting female green turtles</li> <li>Tagging juvenile hawksbill turtles</li> <li>Surveying nesting beaches and activity for plastic impacts</li> <li>Surveying foraging habitats in lagoon</li> </ol>
2. Reef 1	11 Feb – 4 Mar	<b>BPMS expedition 25</b> <ol style="list-style-type: none"> <li>Ines Lange (Exeter University)</li> <li>Marleen Stuhr (Exeter University)</li> <li>Cassandra Benkwitt (Lancaster University)</li> <li>Rachel Gunn (Lancaster University)</li> <li>Margaux Steyaert (Oxford University)</li> <li>Rosalie Dowell (Zoological Society of London)</li> <li>Nicholas Dunn (Zoological Society of London)</li> <li>Bryan Wilson (Oxford University)</li> <li>Joanna Harris (Manta Trust)</li> <li>Alexandra Khrizman (Stanford University)</li> <li>Jennifer Yin (Stanford University)</li> <li>Andrew Mogg (Tritonia Scientific Ltd.)</li> <li>Robert Crawford (ZSL)</li> </ol>	<b>Overall objective:</b> This expedition seeks to undertake a survey of reef condition across the archipelago following impacts caused by the 2015-2017 warming events causing bleaching and mortality. <b>Specific objectives:</b> <ol style="list-style-type: none"> <li>Measuring coral cover and recruitment at repeat sites</li> <li>Replacing temperature loggers</li> <li>Video transects to assess benthic communities</li> <li>Creating a 3-d digital record of reef structure</li> <li>Assessing coral disease</li> <li>Sampling and studying zooplankton</li> <li>Deploying calcification rate recording plates</li> <li>Deploying ARMS to monitor cryptic biodiversity</li> </ol>
3. BIOT plastics	15 Oct – 12 Nov 2021	<b>BPMS expedition 26</b> <ol style="list-style-type: none"> <li>Heather Koldewey (ZSL)</li> <li>Fiona Llewellyn (ZSL)</li> <li>Alice Chamberlain (ZSL)</li> </ol>	<b>Overall objective:</b> Study effects of plastics on turtles, reduce SUP use on DG, make recommendations on suitable recycling options <b>Specific objectives:</b> <ol style="list-style-type: none"> <li>Conduct campaign activities towards SUP reduction</li> <li>Conduct volunteer beach cleans on DG with contractor communities</li> <li>Marine debris transects and plots on turtle nesting beaches in DG and Egmont atoll</li> <li>Take group of volunteers to Egmont for 2- day beach clean</li> <li>Discuss logistics of plastics recycling infrastructure with CO/BIOT HQ</li> </ol>
4. Reef 2	10 Nov- 8 Dec	<b>BPMS expedition 27</b> <ol style="list-style-type: none"> <li>Ronan Roche (Bangor)</li> <li>Jyodee Sanassy Pilly (Bangor)</li> <li>Laura Richardson (Bangor)</li> <li>Jamie McDevitt-Irwin (Stanford)</li> <li>Melissa Palmisciano (Stanford)</li> <li>Rachel Carson (Stanford)</li> <li>Fio Michaeli (Stanford)</li> </ol>	<b>Overall objective:</b> This expedition seeks to undertake further in-depth assessment of reef recovery across the archipelago following impacts caused by the 2015–2016 warming events resulting in coral reef bleaching and mortality, and subsequent deterioration of the reef. <b>Specific objectives:</b> <ol style="list-style-type: none"> <li>Spatiotemporal variations in internal wave driven upwelling and resilience potential in corals across the Chagos Archipelago.</li> <li>Extend existing long-term coral reef datasets.</li> <li>Extend video archive for long term assessment of coral reef benthic communities.</li> </ol>



Project title	Dates	Team	Objectives
		<ul style="list-style-type: none"> <li>8. Joanna Harris (Plymouth University)</li> <li>9. Marleen Stuhr (Plymouth University)</li> <li>10. Andrew Mogg (Tritonia)</li> <li>11. Katherine Dawson (Tritonia)</li> <li>12. Mark Turner (Doctor)</li> </ul>	<ul style="list-style-type: none"> <li>4. Advanced coral studies in response to reef degradation from thermal stress.</li> <li>5. Trophic cascades, mesopredator release and reef resilience.</li> <li>6. Investigating the movement and foraging ecology of reef manta rays (<i>Mobula alfredi</i>).</li> </ul>

## 8 Implementation of Scientific Committee Recommendations and Resolutions of the IOTC relevant to the SC.

**Table 9.** Scientific requirements contained in Resolutions of the Commission, adopted between 2012 and 2021.

Res. No.	Resolution	Scientific requirement	CPC progress
11/04	On a regional observer scheme	Paragraph 9	The UK ran an observer programme between 2017 and 2019 (Section 6.3), this was suspended in 2020 due to COVID-19 and the vessels did not operate in 2020.
12/04	On the conservation of marine turtles	Paragraphs 3, 4, 6–10	All mandatory statistical reports, including null reports are submitted.
12/06	On reducing the incidental bycatch of seabirds in longline fisheries.	Paragraphs 3–7	Not applicable as the UK had no commercial fishery operational in the IOTC area of competence 2021.
12/09	On the conservation of thresher sharks (family alopiidae) caught in association with fisheries in the IOTC area of competence	Paragraphs 4–8	Not applicable as the UK had no commercial fishery operational in the IOTC area of competence 2021.
13/04	On the conservation of cetaceans	Paragraphs 7–9	Not applicable as the UK had no commercial fishery operational in the IOTC area of competence 2021.
13/05	On the conservation of whale sharks ( <i>Rhincodon typus</i> )	Paragraphs 7–9	Not applicable as the UK had no commercial fishery operational in the IOTC area of competence 2021.
13/06	On a scientific and management framework on the conservation of shark species caught in association with IOTC managed fisheries	Paragraph 5–6	Not applicable as the UK had no commercial fishery operational in the IOTC area of competence 2021. Sharks are released alive in the recreational fishery.
15/01	On the recording of catch and effort by fishing vessels in the IOTC area of competence	Paragraphs 1–10	Not applicable as the UK had no commercial fishery operational in the IOTC area of competence 2021.
15/02	Mandatory statistical reporting requirements for IOTC Contracting Parties and Cooperating Non-Contracting Parties (CPCs)	Paragraphs 1–7	Not applicable as the UK had no commercial fishery operational in the IOTC area of competence 2021.
17/05	On the conservation of sharks caught in association with fisheries managed by IOTC	Paragraphs 6, 9, 11	Not applicable as the UK had no commercial fishery operational in the IOTC area of competence 2021.
18/02	On management measures for the conservation of blue shark caught in association with IOTC fisheries	Paragraphs 2-5	Not applicable as the UK had no commercial fishery operational in the IOTC area of competence 2021.
18/05	On management measures for the conservation of the Billfishes: Striped marlin, black marlin, blue marlin and Indo-Pacific sailfish	Paragraphs 7 – 11	Not applicable as the UK had no commercial fishery operational in the IOTC area of competence 2021.
18/07	On measures applicable in case of non-fulfilment of reporting obligations in the IOTC	Paragraphs 1, 4	Not applicable as the UK had no commercial fishery operational in the IOTC area of competence 2021.
19/01	On an Interim Plan for Rebuilding the Indian Ocean Yellowfin Tuna Stock in the IOTC Area of Competence	Paragraph 22	The UK had no commercial fishery operational in 2021. Small amounts of tuna are caught in the recreation fishing in BIOT but since 2018 it has been mandatory to release these (Section 4).
19/03	On the Conservation of Mobulid Rays Caught in Association with Fisheries in the IOTC Area of Competence	Paragraph 11	Not applicable as the UK had no commercial fishery operational in the IOTC area of competence 2021, and therefore does not intentionally or incidentally catch mobulid rays. They are not caught in the recreational fishery, there is no National monitoring programme in place, however research has been undertaken (see publication 1 under section 9).

## 9 LITERATURE CITED [MANDATORY]

MRAG (2019a) Review of FAD papers from the 2nd Joint Tuna RFMO FAD WG Final Report June 2019.

MRAG (2019b) Ocean Currents in structuring FAD and ALDFG beaching in BIOT.

MRAG (2019c) Pilot results of modelling of passive particles through BIOT. October 2019

Publications produced from BIOT 2020-2021

Publication Count	Publication and Authors
1	Andrzejaczek, S., Chapple, T.K., Curnick, D.J., Carlisle, A.B., Castleton, M., Jacoby, D.M.P., Peel, L.R., Schallert, R., Tickler, D.M. and Block, B.A. (2020) Individual variation in residency and regional movements of reef manta rays <i>Mobula alfredi</i> in a large Marine Protected Area. <i>Marine Ecology Progress Series</i> . DOI: 10.3354/meps13270 [April] [other]
2	Bayley, D.T.I. and Rose, A. (2020) Multi-species co-operative hunting behaviour in a remote Indian Ocean reef system. <i>Marine and Freshwater Behaviour and Physiology</i> DOI:10.1080/10236244.2020.1746658 [Mar] [coral reefs]
3	Bayley, D.T.I. and Mogg, A.O.M. (2020) A protocol for the large-scale analysis of reefs using structure from motion photogrammetry. <i>Methods in Ecology and Evolution</i> . DOI: 10.1111/2041-210X.13476 [Aug] [coral reefs]
4	Benkwitt, C.E., Wilson, S.K. and Graham, N.A.J. (2020) Biodiversity increases ecosystem functions despite multiple stressors on coral reefs. <i>Nature Ecology and Evolution</i> . DOI: 10.1038/s41559-020-1203-9 [May] [coral reefs]
5	Carr, P., Votier, S., Koldewey, H., Godley, B., Wood, H., Nicoll, M.A.C. (2020) Status and phenology of breeding seabirds and a review of Important Bird and Biodiversity Areas in the British Indian Ocean Territory. <i>Bird Conservation International</i> . DOI: 10.1017/S0959270920000295 [Aug] [seabirds]
6	Carr, P. (2020). British Indian Ocean Territory. In: Riddington, R. (ed.), <i>Birds of the UK Overseas Territories</i> , pp. 108-127. Bloomsbury, London.
7	Carr, P. (In press) Odonata of the Chagos Archipelago, central Indian Ocean: an update. <i>Notulae odonatologicae</i> , 9(6), 229-235. 10.5281/zenodo.4268581
8	Cinner, J.E., Zamborain-Mason, J., Gurney, G.G., Graham, N.A.J., MacNeil, M.A., Hoey, A., et al. (2020) Meeting fisheries, ecosystem function, and biodiversity goals in a human dominated world. <i>Science</i> 368: 307-311 DOI: 10.1126/science.aax9412 [April] [coral reefs]
9	Collins, C., Letessier, T.B., Broderick, A., Wijesundara, I., Nuno, A. (2020) Using perceptions to examine human responses to blanket bans: the case of the thresher shark landing-ban in Sri Lanka. <i>Marine Policy</i> [Accepted August 2020] [other]
10	Curnick, D.J., Collen, B., Koldewey, H., Jones, K., Kemp, K. and Ferretti, F. (2020) Interactions between a large marine protected area, pelagic tuna and associated fisheries. <i>Frontiers in Marine Science</i> DOI: 10.3389/fmars.2020.00318 [May] [Fisheries]
11	Curnick, D.J., Andrzejaczek, S., Jacoby, D.M.P., Coffey, D.M., Carlisle, A.B., Chapple, T.K., Ferretti, F., Schallert, R.J., White, T., Block, B.A., Koldewey, H.J. and Collen, B. (2020) Behaviour and ecology of silky sharks around the Chagos Archipelago and evidence of Indian Ocean wide movement. <i>Frontiers in Marine Science</i> . [Accepted Nov 2020] [sharks]
12	Curnick, D.J., Feary, D.A., and Cavalcant, G.H. (in press). Risks to large marine protected areas posed by drifting fish aggregation devices <i>Conservation Biology</i> .
13	Dunn, N., Johri, S., Curnick, D.J., Carbone, C., Dinsdale, E.A., Chapple, T.K., Block, B.A. and Savolainen, V. (2020) Complete mitochondrial genome of the grey reef shark, <i>Carcharhinus amblyrhynchos</i> (Carcharhiniformes: Carcharhinidae). <i>Mitochondrial DNA Part B: Resources</i> , 5(3), pp.2080-2082. DOI: 10.1080/23802359.2020.1765208 [May] [sharks]
14	Esteban, N., Mortimer, J.A., Stokes, H.J., Laloë, J-O., Unsworth, R.K.F., Hays, G.C. (2020) A global review of green turtle diet: sea surface temperature as a potential driver of omnivory levels. <i>Marine Biology</i> , 167:183. <a href="https://doi.org/10.1007/s00227-020-03786-8">https://doi.org/10.1007/s00227-020-03786-8</a> [Nov]

Publication Count	Publication and Authors
15	Ferretti, F., Jacoby, D.M.P., Pflieger, M.O., White, T.D., Dent, F., Micheli, F., Rosenberg, A.A., Crowder, L.B. and Block, B.A. (2020) Shark fin trade bans and sustainable shark fisheries. <i>Conservation Letters</i> . DOI: 10.1111/conl.12708 [Jan] [ <i>Sharks</i> ]
16	França, F., Benkwitt, C.E., Peralta, G., Robinson, J.P.W., Graham, N.A.J., Tyliranakis JM, Berenguer E, Lees AC, Ferreira J and Barlow J. (2020) Climatic and local stressors threaten tropical forests and coral reefs. <i>Philosophical Transactions of the Royal Society B: Biological Sciences</i> . DOI: 10.1098/rstb.2019.0116 [coral reefs]
17	Hays, G.C., Cerritelli, G., Esteban, N., Rattary, A. and Luschi, P. (2020) Open ocean reorientation and challenges of island finding by sea turtles during long-distance migration. <i>Current Biology</i> . DOI: 10.1016/j.cub.2020.05.086 [ <i>turtles</i> ]
18	Hays, G.C., Rattray, A. and Esteban, N. (2020) Addressing tagging location bias to assess space use by marine animals. <i>Journal of Applied Ecology</i> .57,10 DOI: 10.1111/1365- 2664.13720 [Oct] [ <i>turtles</i> ]
19	Hays, G.C., Koldewey, H.J., Andrzejczek, S., Attrill, M.J., Barley, S., Bayley, D.T.I., Benkwitt, C.E., Block, B., Schallert, R.J., Carlisle, A., Carr, P., Chapple, T.K., Collins, C., Diaz, C., Dunn, N., Dunbar, R.B., Eager, D.S., Engel, J., Embling, C.B., Esteban, N., Ferretti, F., Foster, N.L., Freeman, R., Gollock, M., Graham, N.A.J., Harris, J.L., Head, C.E.I, Hosegood, P., Howell, K.L., Hussey, N.E., Jacoby, D.M.P., Jones, R., Pilly, J.S., Lange, I.D., Letessier, T.B., Levy, E., Lindhart, M., McDevitt-Irwin, J.M., Meekan, M., Meeuwig, J.J., Micheli, F., Mogg, A., Mortimer, J.A., Mucciarone, D.A., Nicoll, M.A., Nuno, A., Perry, C., Preston, S.G., Rattray, A.J., Robinson, E., Roche, R., Schiele, M., Sheehan, E.V., Sheppard, A., Sheppard, C., Smith, A.L., Soule, B., Spalding, M., Stevens, G.M.W., Steyaert, M., Stiffel, S., Taylor, B.M., Tickler, D., Trevail, A.M., Trueba, P., Turner, J., Votier, S., Wilson, B., Williams, G., Williamson, B., Williamson, M.J., Wood, H., Curnick, D.J. (2020) A review of a decade of lessons from one of the world's largest MPAs: conservation gains and key challenges. <i>Marine Biology</i> . DOI: 10.1007/s00227-020-03776-w [Oct 2020] [ <i>other</i> ]
20	Jacoby, D.M.J., Ferretti, F., Freeman, R., Carlisle, A.B., Chapple, T.K., Curnick, D.J., Dale, J.J., Schallert, R.J., Tickler, D. and Block, B.A. (2020) Shark movement strategies influence poaching risk and enforcement decisions in a large, remote Marine Protected Area. <i>Journal of Applied Biology</i> DOI: 10.1111/1365-2664.13654 [May] [ <i>sharks</i> ]
21	Johri, S., Dunn, N., Chapple, T.K., Curnick, D.J., Savolainen, V., Dinsdale, E.A. and Block, B.A. (2020) Mitochondrial genome of the Silvertip Shark, <i>Carcharhinus albimarginatus</i> , from the British Indian Ocean Territory. <i>Mitochondrial DNA Part B: Resources</i> . DOI: 10.1080/23802359.2020.1765210 [May] [ <i>sharks</i> ]
22	Johri, S., Chapple, T.K., Dinsdale, E.A., Schallert, R. and Block, B.A., (2020) Mitochondrial genome of the silky shark <i>Carcharhinus falciformis</i> from the British Indian Ocean Territory Marine Protected Area. <i>Mitochondrial DNA Part B</i> , 5(3), pp.2416-2417. DOI: 10.1080/23802359.2020.1775147 [ <i>sharks</i> ]
23	Johri, S., Chapple, T.K., Schallert, R., Dinsdale, E.A. and Block, B.A., (2020) Complete mitochondrial genome of the whitetip reef shark <i>Triaenodon obesus</i> from the British Indian Ocean Territory Marine Protected Area. <i>Mitochondrial DNA Part B</i> , 5(3), pp.2347-2349. DOI: 10.1080/23802359.2020.1775148 [ <i>sharks</i> ]
24	Lange, I.D. and Perry, C.T. (2020) A quick, easy and non-invasive method to quantify coral growth rates using photogrammetry and 3D model comparisons. <i>Methods in Ecology and Evolution</i> . DOI: 10.1111/2041-210X.13388 [Mar] [ <i>coral reefs</i> ]
25	Lange, I.D., Perry, C.T., Morgan, K.M., Roche, R., Benkwitt, C.E. and Graham, N.A.J. (2020) Site-level variation in parrotfish grazing and bioerosion as a function of species-specific feed metrics. <i>Diversity</i> . DOI: 10.3390/d12100379 [Oct] [ <i>coral reefs</i> ]
26	Mortimer, J.A., Esteban, N., Guzman, A.N and Hays, G.C. (2020) Estimates of marine turtle nesting populations in the south-west Indian Ocean indicate the importance of the Chagos Archipelago. <i>Oryx</i> . DOI: 10.1017/S0030605319001108 [Feb] [ <i>turtles</i> ]

Publication Count	Publication and Authors
27	Perez-Correa, J., Carr, P., Meeuwig, J, Koldewey, H.J. and Letessier, T. (2020) Climate oscillation and alien species invasion influences oceanic seabird distribution. <i>Ecology and Evolution</i> [seabirds]
28	Perry, C.T., Morgan, K.M., Lange, I.D., Yarlett, R.T. (2020) Bleaching-driven reef community shifts drive pulses of increased reef sediment generation. Royal Society – Open Science7: 192153. <a href="http://dx.doi.org/10.1098/rsos.192153">http://dx.doi.org/10.1098/rsos.192153</a> [coral reefs]
29	Sheppard, C., Sheppard, A. and Fenner, D. (2020) Coral mass mortalities in the Chagos Archipelago over 40 years: Regional species and assemblage extinctions and indications of positive feedbacks. <i>Marine Pollution Bulletin</i> . 154. DOI: 10.1016/j.marpolbul.2020.111075 [May] [coral reefs]
30	Sheppard, C and Sheppard A (2020) Coral wreaths and the rise of phoenix corals. <i>Reef Encounter</i> , 48. [coral reefs]
31	Shimada, T., Limpus, C. J., Hamann, M., Bell, I., Esteban, N., Groom, R. and Hays, G. C. (2020). Fidelity to foraging sites after long migrations. <i>Journal of Animal Ecology</i> . DOI: 10.1111/1365-2656.13157 [Apr but online Nov 2019] [turtles]
32	Taylor, B.M., Chinkin, M. and Meekan, M.G. (2020) Teleconnections reveal that drivers of inter-annual growth can vary from local to ocean basin scales in tropical snappers. <i>Coral Reefs</i> . Doi: 10.1007/s00338-020-01903-z [Feb] [coral reefs]
33	Taylor, B.M., Wakefield, C.B., Newman, S.J., Chinkin, M. and Meekan, M.G. ( <i>in press</i> ). Unprecedented longevity of unharvested shallow-water snappers in the Indian Ocean. <i>Coral Reefs</i> (doi: 10.1007/s00338-020-02032-3) [Dec] [coral reefs]
34	White, T.D., Ong, T., Ferretti, F., Block, B.A., McCauley, D.J., Micheli, F. and De Leo, G.A.(2020) Tracking the response of industrial fishing fleets to large marine protected areas in the Pacific Ocean. <i>Conservation Biology</i> DOI: 10.1111/cobi.13584 [Oct] [fisheries]
35	Williamson, M.J., Tebbs, E.J., Dawson, T.P., Curnick, D.J., Ferretti, F., Carlisle, A.B., Chapple, T.K., Schallert, R.J., Tickler, D.M., Block, B.A. and Jacoby, D.M.P. (2020) Gap analysis of acoustic tracking data reveals spatial and temporal segregation of sympatric reef sharks. <i>Conservation Biology</i> DOI: 10.21203/rs.2.19727/v2 [Feb] [sharks]
36	Yesson, C., Letessier, T., Nimmo-Smith, A., Hosegood, P., Brierley, A., Harouin, M. and Proud, R. (2020) Improved bathymetry leads to 4000 new seamount predictions in the global ocean. <i>UCL Open: Environment</i> . DOI: TBC [Preprint June] [oceanography]